

## T-45 TRAINING SYSTEM (T45TS)



### Navy ACAT IC Program

Total Number of Systems:	169
Total Program Cost (TY\$):	\$5.2B
Average Unit Cost (TY\$):	\$25.6M
Full-rate production:	2QFY95
SEP Production:	3QFY99

### Prime Contractor

Boeing

### SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The T-45 Training System (TS) is an integrated training system with five main subsystems: the T45A/C aircraft, flight simulators, an academics package, the Training Integration System, and contractor logistics support. The T45TS is intended to provide Navy intermediate and advanced student jet flight training, replacing the T-2B/C and TA-4J aircraft and associated training systems. T45TS contributes to the early involvement of training naval aviation aircrew in *precision engagement* of enemy forces.

The T45A/C Goshawk, a derivative of the existing British Aerospace Hawk, is a tandem-seat, lightweight, single-engine aircraft modified for aircraft carrier operations. It incorporates an onboard oxygen generating system, a heads-up display, and a weapons delivery capability for training.

The Simulator Subsystem includes the 2F137 instrument flight trainer and 2F138 operational flight trainer. The 2F137 is a ground-based flight simulator, while the 2F138 adds a wide-angle visual display system.

The Academics subsystem is intended to provide an integrated multi-media system capable of training students and instructors under training. Classroom lectures, workbooks, computer-aided instruction, training devices, and audio-visual media are integrated with the simulator and flight training phases.

The Training Integration System is a management information system using computer hardware, software, communications, and peripheral equipment to facilitate efficient scheduling and use of all training resources (including instructors and students), maintain student and instructor records, and manage curriculum and student flow.

The T45TS is intended to support the *Joint Vision 2020* objectives of preparing joint warriors to meet the challenges of future battlespace by ensuring that they are properly trained.

Contractor Logistical Support (CLS) will be provided at all levels of maintenance and logistics for the T45TS subsystems. The integrated logistic support resources will be established by the contractor, funded by the Navy, and turned over to the contractor for integrated logistic support management. Boeing is presently the Prime contractor for CLS.

The digital Cockpit 21 upgrade to the T-45A, now designated T-45C, involves replacement of dedicated gauges and data entry panels with two 5-inch square, monochrome multifunction display units in each cockpit. In addition, a dual redundant Military Standard-1553B multiplex data bus is incorporated, along with integration of a display electronics unit and removal of some single purpose analog hardware. A combined Global Positioning System /Inertial Navigation System replaces the standard attitude and heading reference system. Software modifications include improvements to the Heads Up Display in the front cockpit. Presently there are 43 T-45C aircraft operating at NAS Meridian.

## **BACKGROUND INFORMATION**

The T45TS entered EMD in 1984. Initial operational testing (OT-IIA) in November 1988 identified several major deficiencies in aircraft handling qualities during carrier waveoffs and missed arrested landings. Consequently, the program acquisition schedule experienced several slips to allow for redesign of the aircraft by Boeing (then McDonnell Aircraft). Subsequently, OT-IIB in 1990 and OT-IIC in 1991 verified improvement of the identified performance deficiencies. The T45TS was determined to be both operationally effective and operationally suitable, and recommended for fleet introduction during OT-IIC (OPEVAL) in May 1994. The OT&E of the T45TS has been conducted in compliance with TEMP Revision 6, which was approved by DOT&E on July 8, 1997.

## **TEST & EVALUATION ACTIVITY**

OT-IIIB, OPEVAL of the Cockpit 21 upgrade, was conducted from February 98 to August 98 at NAS Meridian. Previous T-45A deficiencies include directional stability, engine surge and “pitch buck” which are not corrected with the Cockpit 21 upgrade and still exist. Major deficiencies from OT-IIIB (OPEVAL) include: 1. Constantly Computed Impact Point mode air-to-ground symbology was incorrectly displayed above the horizon during a dive attack, 2. HUD digital airspeed and altitude readout failures, 3. Standby gyro inoperative during total electrical failure, 4. Incorrect HYD 2 Light logic in OFT, 5. Loss of visual system database lighting – disappearing several times per day. 6.

Wingman wingtip light visible through vertical stabilizer, 7. Mean Time Between Operational Mission Failures (MTBOMF) did not meet threshold of 112.5 hours, 8. No indications or consequences for holding brakes during simulated catapult launch, 9. Blown main mount OFT simulation did not adequately represent severe directional control problems of the actual aircraft.

## **TEST & EVALUATION ASSESSMENT**

A Verification of Correction of Deficiencies (VCD) was conducted from 01 Nov99 to 22 Mar00. A total of 745.3 OFT hours were accumulated during this 29 day period and accomplished all test objectives. This VCD was planned to verify correction of major deficiencies of the naval undergraduate jet flight training system (T45TS) discovered during OT-IIIB relating to reliability of the visual and non-visual OFT and visual replication, configuration, safety and flying qualities of the OFT. All Critical Operational Issues (COI's) were resolved and rated satisfactory. The reliability of the OFT's made impressive improvements, achieving a MTBOMF for the OFT without the visual display of 372.7 hours (threshold 225.0 hours) and 604.8 hours (threshold 112.5 hours) for the OFT with the visual display. All of the major deficiencies from OT-IIIB were corrected except for inadvertent application of brakes during a catapult launch. The OFT simulation of a blown tire was corrected. Since the OFT can now simulate the severe directional control problems associated with a blown main mount during landing rollout, which is the result of holding onto the brakes during a catapult. This and an aggressive training effort to train students in the consequences have met student objectives; thus the COI was redesignated as a minor deficiency. As a result of the OPEVAL and subsequent VCD, the T45TS was determined to be operationally effective and operationally suitable.

